EXHIBIT C

UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF OHIO
EASTERN DIVISION

IN RE: NATIONAL PRESCRIPTION OPIATE LITIGATION	)	MDL No. 2804
	)	Case No. 1:17-MD-2804
THIS DOCUMENT RELATES TO ALL CASES	)	Hon. Dan A. Polster

Friday, April 26, 2019

HIGHLY CONFIDENTIAL - SUBJECT TO FURTHER CONFIDENTIALITY REVIEW

Videotaped Deposition of G. CALEB ALEXANDER, M.D., M.S., held at the Law Offices of Peter Angelos, 100 North Charles Street, Suite 2200, Baltimore, Maryland, commencing at 9:03 a.m., on the above date, before Michael E. Miller, Fellow of the Academy of Professional Reporters, Registered Diplomate Reporter, Certified Realtime Reporter and Notary Public.

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PROCEEDINGS
(April 26, 2019 at 9:03 a.m.)
THE VIDEOGRAPHER: We're now on the record. My name is David Lane, videographer for Golkow Litigation Services. Today's date is April 26th, 2019. Our time is 9:03 a.m.
This deposition is taking place in Baltimore, Maryland in the matter of National Prescription Opiate Litigation. Our deponent today is Dr. George Caleb Alexander, M.D., M.S.
Counsel will be noted on the stenographic record. The court reporter today is Mike Miller, who will now swear in the witness.

G. CALEB ALEXANDER, M.D., M.S.,
having been duly sworn,
testified as follows:
EXAMINATION
BY MR. SNAPP:
Q. Good morning, Dr. Alexander. I'm Erik Snapp, I represent the Purdue defendants. I'll be asking you the initial

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set of questions today.
First of all, have you been deposed before?
A. No, I have not.
Q. So let me just give you a few ground rules. First of all, it's really important that we not speak over each other, so if you'd wait until I finish my question before you start your answer, Mike here will be able to get down a better record.
Second of all, if you have any questions or if my questions are unclear, please let me know and I'll try to clarify my questions. Otherwise, I'll assume that you understand my questions; is that fair?
A. Yes, it is.
Q. Okay. Very good.
You understand that you're here testifying in a case that's set to go to trial in Ohio in October? Do you understand that?
A. I do.
Q. And have you been asked to testify at trial in this case? Have you been asked to set aside any time to testify at

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trial?
A. No, I have not.
Q. Do you anticipate that you will be testifying at trial?
A. I don't know.
Q. One other thing. At any time, if you need a break, just let me know and we'll take a break, a short break, as long as there's not a question pending.
Fair enough?
A. Yes.
Q. Okay. Good.
So, Doctor, I want to start by trying to define some terms that were used in your expert reports.
First of all, can you tell me, when you use the term "opioids," what do you mean?
A. It would depend upon the context.
Q. Okay. Can you explain?
A. In -- you know, without looking at the report, you know, it's hard to provide a specific instance or example, but in general, I'm probably referring to both

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prescription and nonprescription opioids.
Q. And when you're talking about nonprescription opioids, what are you referring to?
A. Once again, it would be helpful to know the specific context within the report, but generally, heroin and illicit fentanyl and fentanyl derivatives.
Q. How do you define opioid use disorder? And if you want to know what I'm referring to, in paragraph 40 of your report, which I'll show you in a little bit -- you'll just have to take my word for it now unless you want to see it -- you referred to the formal criteria for an opioid use disorder. But I didn't see those formal criteria listed anywhere in your report, so what are those?
MS. RITTER: Objection, form. It's compound.
MR. SNAPP: Let me just ask a new question.
BY MR. SNAPP:
Q. What are the formal criteria for an opioid use disorder?
A. Well, having referred to my

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Q. Did you meet with any representatives of Cuyahoga County?
A. Once again, there may have been representatives at the meeting. I do not know.
Q. Did you meet with anyone from Summit County?
A. Yes.
Q. And who did you meet with from Summit County?
A. I do not know.
(Whereupon, Deposition Exhibit Alexander-4, Questions Re: Treatment and Recovery/Notes from Akron, was marked for identification.)
BY MR. SNAPP:
Q. I'm just going to mark for the record the notes of that meeting just so we're clear. This is Deposition Exhibit 4. I just want to be clear what we're speaking about. I'll come back to those and ask some questions about them later, but for now I just want to mark them for the record so we're all on the same page.
A. Okay.

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Q. So you're saying it's possible that you did meet with someone from Cuyahoga and Cleveland, but you don't know?
A. Correct.
Q. Other than the meeting in Akron, did you conduct any research in Cuyahoga County or Summit County related to this case?
A. Do you mean primary research where I would interview patients, or what do you mean by research?
Q. What do you mean by research?
A. Can you ask the question again, please?
Q. I'm just trying to understand: Other than the meeting in Akron --
A. Yeah.
Q. -- in July of 2018, did you do anything else to -- do any research in the counties that we're talking about, Cuyahoga and Summit Counties?
A. I did. I did.
Q. What did you do?
A. I reviewed a variety of materials that have been produced or provided

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for this case that reflect the conditions on the ground in these counties.
Q. And are those the materials that we received with your expert report? We received a list of materials that included some task force reports and other things. Are those the materials you're talking about?
A. Yes.
Q. And did you receive those materials from counsel, plaintiffs' counsel?
A. Yes.
Q. So other than reviewing some documents provided to you by plaintiffs' counsel, you didn't do anything else to do any research, conduct any research in Cuyahoga and Summit Counties; is that fair?
A. Yes.
Q. Now, there were some changes to your reports, and I want to start with Deposition Exhibit 1 and Deposition Exhibit 2, and I want to make sure I understand the changes that you made between Exhibit 1 and Exhibit 2.
MS. RITTER: Objection to the form. And I think that they're

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numbered the other way.
MR. SNAPP: I think you're right.
MS. RITTER: Exhibit 2 is -- okay. Yeah.
MR. SNAPP: I think you're right. Thank you for clarifying.
MS. RITTER: Okay.
BY MR. SNAPP:
Q. So Exhibit 2 is your original report from March 25th. I want to understand the differences between Exhibit 2 and the April 3rd report that's marked as Exhibit 1.
Can you tell me, first of all, why did you make changes?
A. I thought I could provide better estimates.
Q. Okay. And why did you think that?
A. In reviewing the components of the -- in reviewing the estimates that we provided, I identified areas where I thought that we could make more conservative and better estimates either of the population within a given category or the costs

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Q. -- with the corrections that are listed on Table 1 --
A. Correct.
Q. -- of Deposition Exhibit 3, correct?
A. Yes.
Q. So is it fair to say that those corrections essentially remove from your analysis Scenario A?
A. Yes.
Q. And I noticed that in this exhibit that we've marked as Deposition Exhibit 3, which is your updated April 17th supplemental report, you did not do a Cuyahoga- and Summit-specific mapping calculation that you had done previously in the other exhibits.
A. Uh-huh.
Q. Will you be restricting your testimony -- I guess I'm just trying to understand.
Is Deposition Exhibit 3 -- it seems to show that your testimony will only focus on national abatement costs at this point; is that correct?

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A. Well, I don't -- as I said, I don't know if I'm testifying.
Q. Understood. But do you have -- I didn't see any attempt in Deposition Exhibit 3 to allocate Scenario B, C and D to Cuyahoga and Summit Counties.
A. Is that a question or can you ask a question about --
Q. Well, is there some attempt? Did I just miss it I guess is the question?
A. No, you did not.
Q. Okay. So you have not done that next step to try to take these abatement costs that are listed in Deposition Exhibit 3 and figure out which portion of the national abatement costs are apportioned to Cuyahoga and Summit Counties; is that fair?
MS. RITTER: Objection to the form.
A. Yes, that's fair.
BY MR. SNAPP:
Q. Do you intend to do so?
A. Not at this time.
THE WITNESS: Can we do a five-minute break at your convenience?

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MR. SNAPP: Absolutely. This is a good time.
THE WITNESS: Okay. Very good.
THE VIDEOGRAPHER: Going off the record at 10:05 a.m.
(Recess taken, 10:05 a.m. to 10:15 a.m.)
THE VIDEOGRAPHER: We're back on the record at 10:15 a.m.
(Whereupon, Deposition Exhibit Alexander-5, Alexander Curriculum Vitae, was marked for identification.)
BY MR. SNAPP:
Q. Dr. Alexander, I've handed you what's been marked as Deposition Exhibit 5, which is your CV that was provided to us. I'm not going to spend a lot of time on it. I just want to understand: Is this your current CV?
A. Well, I may have an update, you know, on my desktop from April, but it reflects a recent CV.
Q. Okay. Do you have any additions you'd like to make to it at this time? I guess a better question would be:

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The one on your desktop, have you made additions to that in the last couple of months? Because this one is marked -- it's dated February 2019.
A. I was promoted to full professor.
Q. Congratulations.
A. Thank you.
Q. Other than being promoted to full professor, are there any other changes you can think of?
A. There are -- I mean, the most relevant would be additional publications.
Q. Okay. Can you think of any in particular that you've published since February of 2019? Looks like the last one is on page 25. There's a publication number 243.
A. No, I cannot.
Q. Okay. Are you board certified?
A. Yes, I am.
Q. In what?
A. Internal medicine.
Q. Okay. I see that right down at the bottom of page 1; is that right? Am I

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been asked to do that in preparation of my expert report.
Q. Have you been asked to provide any opinions with respect to any defendant's conduct historically, its historic conduct?
A. No, I have not.
Q. Have you been asked to provide any opinions with respect to the cause of the opioid crisis or opioid epidemic, as you put it?
A. Yes, I have.
Q. And what opinions do you intend to offer if you testify at trial with respect to the cause of the opioid crisis?
A. May I look briefly at my report?
Q. Certainly.
A. So paragraphs -- there are paragraphs in my report that address what I referred to as the genesis of the epidemic, so I don't know if that answers your question, but I guess my -- maybe you could repeat your question for me.
Q. Which paragraphs are you referring to, Doctor?

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A. Could you repeat your question, please, just so I'm sure I refer to the right paragraphs.
Q. Well, I'm just trying to understand if you have been asked to provide opinions in this case with respect to the cause of the opioid crisis or opioid epidemic.
A. I mean, I'd say only in the highest -- only at the highest level of abstraction. I was asked to provide my best judgments about what interventions should be employed to abate the epidemic.
So in sort of laying the groundwork for that in my report, I do discuss, for example, in paragraph 16, the modern opioid epidemic can be traced to the 1980s; paragraph -- paragraphs 31 through 34, where I discuss misconceptions that I believe must be addressed. So, for example, there's a conflict between reducing opioid oversupply and improving quality of care for people with pain.
So those are the only places in my report where I discuss -- that I think are

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relevant to your question.
Q. So I'm just trying to understand.
So will you be -- if you testify at trial, do you expect to provide testimony related to any defendant's responsibility for the opioid crisis?
MS. RITTER: Objection, asked and answered.
A. I will do my best to speak to whatever I'm asked to speak to, but my report that I submitted contains what I've focused on and what I would anticipate would be the focus of any testimony.
BY MR. SNAPP:
Q. Okay. I'm just trying to understand if you're going to be providing testimony that any of the defendants caused the opioid crisis or opioid epidemic, and if so, I'm going to ask you questions about what they did, so...
A. Of course. Of course.
I don't anticipate doing so.
Q. Thank you.
So I noticed that in your CV --

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well, strike that.
Just to be clear, there's one statement in paragraph 16, and I just want to ask about --
MS. RITTER: Excuse me, do you mean Exhibit --
MR. SNAPP: Paragraph 16 in Deposition Exhibit 1.
MS. RITTER: Okay.
MR. SNAPP: I'm sorry. I might be looking at the wrong paragraph. Forgive me.
BY MR. SNAPP:
Q. Now, in the spillover sentence from page 4 to page 5, you refer to the activities of a number of intermediary organizations supported by manufacturers.
Do you see that?
A. I do.
Q. What organizations are you referring to in that sentence?
A. Well, I believe they're cited and discussed in the references that I provide to support that assertion, and I also see in footnote 3 that I provided some

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identify methods that have evidence behind them that can be implemented, and to reduce opioid-related injuries and addiction and death.
Q. Is the goal to completely eliminate opioid-related injuries and addiction and death?
A. Well, you know, I -- no, it is not.
Q. So you said it's to reduce opioid-related injuries and addiction and death. How much are you seeking to reduce?
A. A lot. I mean we have an enormous way to go, so -- and I think, you know, there's an enormous need in Summit and Cuyahoga Counties, and, you know, it's clear that there's an epidemic in those counties. And so there's an enormous way to go.
Q. You used something called the Markov model in your work in this case; is that correct?
A. Yes, it is.
Q. Can you describe for me, what is the Markov model?
A. A Markov model is a

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mathematical model that allows for one to examine dynamic processes within a population.
Q. Now, I've looked at a lot of the papers that you've written, and I didn't see any that included the Markov model. Have you -- correct me if I'm wrong. Have you ever published with respect to the Markov model?
MS. RITTER: Objection, form.
MR. SNAPP: Let me ask a clearer question.
THE WITNESS: Please.
BY MR. SNAPP:
Q. Sure. I'm just trying to understand. Have you used the Markov model in academic research before your participation in this case?
MS. RITTER: Objection, form.
A. I believe -- can you ask one more time, please?
BY MR. SNAPP:
Q. Sure.
I'm just trying to understand if you've used the Markov model in a

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non-litigation context --
MS. RITTER: Did you say a --
BY MR. SNAPP:
Q. -- prior to this?
MS. RITTER: -- a Markov model? Is that what you said? I couldn't hear you. I'm sorry.
MR. SNAPP: I might have said the Markov, but we can use a Markov model.
BY MR. SNAPP:
Q. Have you used a Markov model prior to your work in this case?
A. I have not.
Q. Do you know if the Markov model that you used in this case has been subject to any peer review?
A. It has, but -- it has.
Q. In what context?
A. It's based on the inputs of a number of renowned modeling experts.
Q. Who are those experts?
A. Harold Pollack, P-O-L-L-A-C-K, David Dowdy, D-O-W-Y [sic], are the main two, but it also reflects the contributions of

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Jeromie Ballreich, J-E-R-O-M-I-E, B-A-L-L-R-E-I-C-H.
Q. And did you consult with Mr. Pollack and Mr. Dowdy and Mr. Ballreich in preparing your report in this case?
A. Regarding the component of the report that's focused on the Markov model, I did.
Q. You did?
A. I did.
Q. Okay. And where are these three -- is -- Mr. Ballreich is one of your employees, right?
A. He's a consultant, yes.
Q. As is Mr. Dowdy and Mr. Pollack, correct?
A. Yes.
Q. They're on the list of people you told me before were paid by your company; is that correct?
A. Yes. Yes.
Q. And so when I asked you if it has been subject to any peer-review process, let me ask it sightly differently.
Has the Markov model that you

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used in this case been subject to any peer review through the publication process?
A. It has not.
Q. Do you consider this an economic model?
A. Well, it's useful for both epidemiology and economics.
Q. Have you ever used it -- I think you said you -- well, strike that.
What training have you received yourself on using a Markov model?
A. I have -- can you ask again, please?
Q. Sure.
I'm just trying to understand what training you've received with respect to using a Markov model.
A. Right. My learning about this methodology has occurred through working with the people that I identified as well as working previously with health economists, primarily at the University of Chicago during my training there, and during my subsequent faculty life there.
Q. And so that was in the early

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2000s?
A. Yes.
Q. And since then, have you used a Markov model in any context for any analysis that you have performed?
A. I have not.
Q. How did you choose the Markov model for this case? How did you choose to use a Markov model as opposed to some other model?
A. It's a useful tool in this instance because of its ability to allow for one to follow populations over time and through different transition states. And I think this is the reason that two or three prior models of the opioid epidemic that have been published have also used Markov models and upon which our model was based.
Q. And are you referring to the Chen and Pitt articles that you cited in your report?
A. Among others, yes.
Q. Do you consider yourself an expert in the application of a Markov model?
A. I think in this instance I

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consider myself an expert in helping to advise the courts regarding the remedies that should be instituted in any abatement plan as well as understanding the costs of those remedies. And as part of that, I believe the Markov model provides value.
Q. Did you consider using anything other than a Markov model to estimate abatement costs in this case?
A. Yes.
Q. What other models did you consider?
A. So we considered just a flat spreadsheet, you know, just a flat Excel file, rows and columns. We considered a decision tree, we considered a systems dynamics model, and we considered a Markov model.
Q. And why did you choose a Markov model over the three other methodologies you just mentioned? Why did you decide on a Markov model as opposed to a flat spreadsheet, a decision tree or a systems dynamics model?
A. We felt it would give us the

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best answers to the questions that we posed.
Q. Are there any limitations to the Markov model that you used?
A. Yes.
Q. What are those limitations?
A. One limitation is that it's dependent upon assumptions about the populations and transitions -- the populations within different compartments of the model, if you will, and the transitions that individual -- the probabilities of transitioning from one compartment to another.
Q. Okay. There are also assumptions with respect to certain costs that you've used as well, right?
A. Yes.
Q. So there are assumptions related to the populations, the transitions and the costs.
Any other assumptions that you can think of? I should say any other categories of assumptions?
A. Assumptions or limitations?
Q. Well, you identified the fact

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that it's dependent -- that the model is dependent on assumptions --
A. Right.
Q. -- as a limitation of the model.
A. Right.
Q. And I'm asking if there are other assumptions other than population, transition and costs.
A. I mean, those are the big ones.
Q. Okay. So other than the fact that the model is dependent on assumptions, are there other limitations to your model?
A. Well, the epidemic is dynamic, and so I think that the answer is no -- I mean, I think that assumptions are the major matter here. The epidemic is dynamic and will continue to change and evolve, and so -- so what we've done and what I've tried to do in my report is to provide a framework for the courts and parties to use going forward.
Q. Okay.
(Whereupon, Deposition Exhibit Alexander-7, 2018 Pitt et al Publication, was marked for

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identification.)
BY MR. SNAPP:
Q. I'm handing you, Doctor, what's been marked as Deposition Exhibit 7. Do you recognize this as the Pitt article that you cited in your report?
A. I do.
Q. And the Pitt article, if you turn to -- I'm sorry, give me one moment, please.
The Pitt article lists a number of limitations on page 1399.
A. Uh-huh.
Q. You see those?
A. Yes.
Q. So the first one is: The drivers behind the opioid epidemic are dynamic, nonlinear and uncertain.
Do you agree with that as a limitation to your model as well?
A. I do.
Q. And the authors here go on to say: Although we tested the impact of each policy on multiple potential models of the current state, the epidemic continues to

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change and may be substantially different in just five years. For example, the increasing prevalence of fentanyl makes heroin use more deadly.
Did I read that correctly? As a --
A. Yes.
Q. And do you agree that the same -- that limitation that the authors of the Pitt article identified is also a limitation of your use of the Markov model?
A. It is. And -- it is, and that falls under the category of the assumptions that are made regarding the populations and the transition probabilities. But, yes, I do certainly agree with that.
Q. The second limitation that the authors of the Pitt article identify was, the next paragraph says: Substance use disorder is a complex disease with varying degrees of severity and high relapse and recurrence rates. Our model is a simplification of the phenomenon intended to capture only enough detail to inform key high-level policy questions.

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Does that paragraph that I just read also apply as a limitation to your use of the Markov model in this case?
A. Well, our model, we believe -- I believe improves upon prior models in several ways. So, for example, we allow for many different subgroups of patients with opioid use disorder that take into account the varied complexity that Pitt is referring to.
We account for the large population of individuals that have prior opioid use disorder, but not past-year opioid use disorder, and there's several other differences as well between our model and the Pitt model that we believe address this concern.
But nevertheless, I would still agree, substance use disorder is a complex disease and with varying degrees of severity and high relapse and recurrence rates. And our model nevertheless still represents a simplification. I believe it is -- improves upon the Pitt one in several ways, but it is a simplification, yes.

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Q. And then if we skip down to the final limitation that's articulated in the Pitt article, the authors say: Though we model the U.S. population on average to gain high-level policy insights, different geographical regions, age groups, races and genders will experience different severities and drivers of opioid-related problems.

As an initial matter, do you agree with that statement?

A. Yes, I do.

Q. And do you agree that that is a limitation of your model?

A. I think for the purposes that we designed our model, I'm not sure that this is inherent limitation. Our effort wasn't to provide inputs to provide specific estimates for Cuyahoga and Summit Counties, although our model could potentially be used for that purpose.

But it's certainly the case that there's geographic variation in the ways that the epidemic has manifest, if that's what you're asking.

Q. Well, I'm just trying to

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understand if your model has the same limitation that this model does in terms of if you wanted to localize your national estimates to a particular geographic location, you'd have to deal with these limitations identified in this paragraph that I just read from the Pitt article; is that fair?

A. One would have to consider those matters, yes.

Q. And that's not something that you've done in your work for this case with respect to Cuyahoga and Summit Counties, correct?

A. No, that's not fully correct.

Q. How is that incorrect?

A. We -- I have attempted to use limited data from the counties that was available to try to -- I've considered and looked at some limited county data to see whether, you know, in an effort to consider applying the model locally, but I did not pursue that exercise.

Q. Okay. So just so we're clear, you have not applied your model locally based

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on the criteria that we just read from the Pitt article or any other criteria. Fair enough?

MS. RITTER: Objection, form, compound.

THE WITNESS: Can you ask that again, please?

MR. SNAPP: Let me just be very simple.

BY MR. SNAPP:

Q. You have not attempted to apply your model locally in Cuyahoga and Summit Counties, correct?

A. No, that's correct. And in my report I speak to -- I speak to this matter in the way that I believe that our national estimates can be useful, and as well as the limits of their utility for developing precise estimates for the Cuyahoga and Summit County.

Q. Fair enough.

So, sir, you refer in your report to something called the APOLLO model. What is the APOLLO model?

A. The APOLLO model refers to the

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Markov model that we used to estimate changes in populations affected by the opioid epidemic over time.

Q. And APOLLO is in all caps. Is it an acronym for something?

A. It is not an acronym.

Q. So is this a model -- the APOLLO model, is this something that your company, Monument Analytics, came up with?

A. Yes, it is.

Q. So it's not a model that's published anywhere; is that fair?

A. Yes, that's true.

Q. In terms of -- is the APOLLO model -- I just want to make sure I'm using the right terminology for the rest of the day.

A. Of course, of course.

Q. Is the APOLLO model the same as the Markov model for purposes of your report?

A. Yes, it is.

Q. So the APOLLO model is your application of the Markov model to this case; is that fair?

A. Yes, it is.

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Q. Okay. Thank you for clarifying that. Okay.
So why don't we take a short break before I move any deeper into the model.
MS. RITTER: Good idea. Everybody get some coffee.
THE VIDEOGRAPHER: Going off the record, 11:31 a.m.
(Recess taken, 11:31 a.m. to 11:43 a.m.)
THE VIDEOGRAPHER: We're back on the record at 11:43 a.m.
BY MR. SNAPP:
Q. So, Doctor, we were talking about the APOLLO model, the APOLLO Markov model that you used in this case, and I want to ask you some questions in particular about how you determined the sequencing in the APOLLO model.
MR. SNAPP: David, could I get my computer screen, please.
BY MR. SNAPP:
Q. So I've put on the screen one of the pages from one of your supporting

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spreadsheets. Do you recognize this document?
A. I do.
Q. It's very difficult to print it out because of the format, so I thought it would be easier just to show it on the screen.
MR. SNAPP: And we'll mark a thumb drive with these on so that we'll all be on the same page in terms of what's in the record, okay? Is that okay with you?
MS. RITTER: Okay.
BY MR. SNAPP:
Q. So I want to understand the sequencing. So your model assumes that from the general population, which is shown in the top left box number 1 or bubble number 1, people can only transition directly into medical use of opioids or to heroin use, correct?
A. Yes.
Q. In other words, a person cannot transition directly from the general population to nonmedical use of opioids under

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your model.
Am I correct about that?
A. Yes.
Q. What's your basis for not including a transition directly from the general population to the nonmedical use of opioids?
A. Can you go to the Inputs tab, please?
Q. Certainly. What do you need -- before we go there, what do you need to look at to answer my question?
A. Yeah. So I'm interested in reviewing the inputs that go -- that lead from Box 1, the transition probabilities from Box 1.
Q. Okay.
A. So I just would like to confirm the transitions that are depicted.
Q. And just so we're clear, just so the record is clear, what I'm talking about is that you can go from the general population down to -- which is Box 1, down to Box 3H, or you can go from the general population to Box 2, which is the medical use

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of opioids.
But under your model, you can't go from the general population, Box 1, down to Box 3, which is the nonmedical use of opioids. Correct?
A. Yes.
Q. Okay. And you'd like to look at the inputs, which I've put on the screen now.
A. Correct. So if you scroll down further, please.
Q. Yes, sir.
A. And further still. Okay.
MS. RITTER: Can we make it clear for the record which table -- it's going to be hard for people --
MR. SNAPP: Yes, we're looking at the table that's -- the filename is MAT Model 2.0 version 51.xlsm.
My understanding is that this table, including the filename at the very top, will be reflected on the video record.
A. So thank you for this. That was helpful.

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So in some cases we may not have had a transition -- so I think -- so you had asked why there's not a direct transition from general population to nonmedical use.
BY MR. SNAPP:
Q. Correct.
A. And the model represents a schematic or a simplification of all of the -- necessarily represents a simplification of all of the potential transitions and populations, just as we discussed a few minutes ago with the Pitt's approach. And it may also have been that we didn't feel that we had as reliable inputs to provide a transition probability for this number.
Q. Okay. Well, I'd like you to keep this -- we're going to keep this on the screen, but I'd like you to take a look at Deposition Exhibit 1, which is your report. It's right on the top there. It's your April 3rd report. And I'd like you to flip to page 25, paragraph 73, please.
I'm directing you in particular -- feel free to read the whole

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thing, if you'd like, but I'm particularly interested in the last sentence of that paragraph 73 of your report.
And just for the record, it reads: For example, of the 11.4 million individuals in the United States reporting opioid misuse in 2017, more than four-fifths, 83%, reported that they bought, were given, or stole opioids from individuals who were in turn prescribed these drugs by a licensed prescriber.
Did I read that correctly?
A. Yes.
Q. And so my question is: Your model does not account for that 83% of people in 2017 who reported opioid misuse and bought, were given, or stole opioids from individuals who were, in turn, prescribed those drugs by a licensed prescriber, correct?
A. I do not believe that's correct.
Q. Well, some of these 83% would have gone directly from the general population, which is Box 1 on the chart,

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directly to Box 3, nonmedical use of opioids, by either being given, buying or stealing opioids from individuals who were, in turn, prescribed the drugs by a licensed prescriber, correct?
A. There -- each box has a population associated with it. So if you go to the Inputs tab again, Tab 3.
Q. Okay. Can you answer my question first?
A. Can you please ask the question again?
MR. SNAPP: Mr. Court Reporter, could you please read the question back.
(The following portion of the record was read.)
"QUESTION: Well, some of these 83% would have gone directly from the general population, which is Box 1 on the chart, directly to Box 3, nonmedical use of opioids, by either being given, buying or stealing opioids from individuals who were, in turn, prescribed the drugs by a

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licensed prescriber, correct?"
(End of readback.)
A. It's hard for me to understand -- I mean, it's hard for me to understand the question. I mean, I agree with this question in the report -- or this statement in the report, and I can explain the way that we addressed the significant population of people that use opioids nonmedically.
But we do not have a direct transition probability over time from the general population to nonmedical use of opioids.
We do consider the significant number of people that use opioids nonmedically and our model does allow for these individuals to use opioids nonmedically without having received a prescription first.
So I think if, you know -- but as to the -- you know, as to the specific reason for the absence of a transition probability from Box 1 to Box 3, I would want to spend more time looking at the model and consulting with the others that developed it

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with me.
BY MR. SNAPP:
Q. But just to be clear, this concept page that we're looking on -- at right now is intended to show the different transitions that are accounted for in your model, correct?
A. Yes.
Q. The transitions from one population to another population?
A. Yes. Although there are some transitions that are not depicted in this schematic.
Q. When we looked at the inputs, Tab 3, there was no transition probability for going from the general population to the nonmedical use of opioids, correct? If we go down to the -- maybe I went past it.
A. If you go up here -- so can you go up further, please? And up further still, please. Up further still, please.
So Box 3 has 5 million individuals in it in --
Q. That is misuse of opioid population that I've highlighted?

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A. Correct, the box that we were looking at has 5 million individuals in it at the start of the model.
Q. Understood. But you do not take into account anywhere here a transition from the general population to nonmedical use of opioids, correct?
A. I think that the model allows for a growth in this population over time, but it is a pathway that's mediated through prescription opioid use, yes.
Q. So in other words, in your model, the only way someone gets to nonmedical use of opioids is to first get a prescription for prescription opioids, correct?
A. No. At the start of the model, the model runs through 10 or 15 years, and at the starting population of the model, there's 5 million individuals that have nonmedical use.
Q. Fair enough. Let me rephrase my question.
So your model does not permit any additional population -- additions to the

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population of those who have nonmedical use of opioids, unless they first get a prescription. Fair enough?
A. Yes, I believe that's -- that's the case.
Q. And does that fact impact the ability of your model to predict what really happens in the real world based on the fact that there are 83%, according to your report, who reported that they bought, were given or stole opioids from individuals, who were, in turn, prescribed these drugs by a licensed prescriber?
A. I'm not sure that it does.
Q. It could though, right?
A. Theoretically, it could, yes.
Q. Because if you don't account for those people, your numbers are not going to be reliable.
A. I'm sorry, say that again, please.
Q. If you don't account for the people who went from the general population at the beginning of your model, they were in that general population number, which you

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have as over 240 million people, if they then buy, are given or steal opioids from individuals who were in turn prescribed these drugs by a licensed prescriber, they will not be reflected accurately in your model, correct?
A. Well, once again, my guess would be that either -- there are dozens or a hundred or more different inputs and populations in the model.
Q. Correct. We'll be looking at some of those.
A. And we assess its performance relative to other models as well as to data that we have in hand. We calibrate the model, and it both is calibrated -- you know, it's both calibrated to data that exists and we also assess its performance relative to others.
But the model represents a simplification, and so the absence of a specific transition probability from Box 1 to Box 3 I believe represents either a decision regarding a simplification or a data point that wasn't readily available to us, so we

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A. Uh-huh.
Q. You note that the exact -- in the second sentence, the exact costs of abatement are difficult to estimate.
Do you agree with that?
A. Yes.
Q. And you agree that those exact costs of abatement will depend upon the population requiring services and the programs in existence in each jurisdiction?
A. Yes. If you're asking about jurisdiction-level costs, yes, those costs I believe will depend upon the specifics of individual jurisdictions.
Q. Including the populations requiring services and the existing programs, correct?
A. Yes.
Q. Okay. And in paragraph 176, you described your analysis as a preliminary analysis of the national costs of 15 types of remedies, correct?
A. Yes.
Q. And if we look at Deposition Exhibit 3, which is the April 17th update to

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your supplemental expert report, do the estimates -- if you turn to the third page -- there it is -- the table also refers to your estimates as preliminary estimates, correct?
A. Yes.
Q. Can you explain what you meant in this context by preliminary estimates?
A. I meant that, you know, as I state, my goal wasn't to identify the precise costs in a given category, but to provide an initial estimate and initial framework upon which more precise estimates could be derived. So by preliminary, I meant a reasonable starting point.
Q. And then as you explained in your report, in paragraph 180, detailed assessments of the specific costs in Cuyahoga and Summit Counties will be required, and there are a number of limitations in extrapolating from national estimates to specific localities.
That's what you said in your report, correct?
A. Yes.
Q. And you have not conducted any

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detailed assessments of the specific costs within Cuyahoga and Summit Counties that will be required in this case -- strike that.
Is it fair to say, sir, that you have not conducted any detailed assessments of the specific costs within Cuyahoga and Summit Counties?
A. Yes, sir.
Q. Now, you have -- going back -- we touched on this earlier. In Deposition Exhibit 3, you have four different scenarios, and correct me if I'm wrong, but I believe you testified earlier that Scenario A is no longer in play, for lack of a better term; is that fair?
A. Yes.
Q. So the focus would be on Scenarios B, C and D; is that correct?
A. Yes.
Q. Okay. And so we talked earlier that Scenario C is simply Scenario A with the corrections included on the first page of Exhibit 3, correct?
A. Yes.
Q. And can you describe for me

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what Scenario B is?
A. Scenario B provides an estimate that assumes that -- the status quo with respect to the provision of treatment for opioid addiction and other services for opioid use disorder over time.
So Scenario B assumes that there's no increased treatment provided for opioid use disorder; that there is no reduction in the churning of patients that have opioid use disorder; and that the population in year one of these estimates, in other words, the 2019 population, is fixed for the remaining nine years of observation.
So essentially -- and that there's no infrastructure expansion for the treatment of opioid use disorder.
So Scenario B essentially assumes the status quo, takes the costs of treatment in year one, assumes the populations remain fixed as they are in year one, in other words, doesn't account for any changes in dynamic population flow, and multiplies by ten and accounts for the price of inflation.

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A. Yes, sir.
Q. And that's in line 21.
And in every year from 2011 to 2016 your model overestimated the total OUD population based on actual experience, correct?
A. Well, I think in the first year, isn't our model lower than the actual?
Q. I'm sorry, I said 2011 to 2016.
A. Oh, I see, yes, yes.
Q. So 2011, '12, '13, '14, '15 and '16, your model overestimated the total over -- I'm sorry, opium -- tell me what OUD is.
A. OUD, opioid use disorder.
Q. Thank you, opioid use disorder. Your model overestimated opioid use disorder population in every one of those years from 2011 to 2016, correct?
A. Yes, sir.
Q. In fact, it was 15% higher in 2016. If you look at 2016, this column, column O, this is the 2016 predicted versus actual.
And in 2016, you were 15%

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higher than the actual data, correct?
A. Yes, sir.
Q. Now, did your model -- did you do anything to address in your model the fact that your model was overpredicting the population for opioid use disorder?
A. Well, I mean, this model has dozens of moving parts, and overall, I was pleased with the -- and felt satisfied for the purposes of this report in the calibration that we were able to achieve.
Opioid use disorder is -- you know, there are a number of shortcomings in the ways that opioid use disorder is captured and defined in the NSDUH, and so we -- so I feel that this is -- you know, so we focused on calibrating the model most tightly to more recent years and to outcomes and populations such as the population with the total population and the population with overdose that we had the greatest confidence in.
Q. So is the answer to my question that you did not do anything to try to recalibrate your model based on the 15% difference in 2016 between your model's

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predictions and the actual-world data?
A. That's not -- not the case.
Q. What did you do to try to change your model so that it was -- it more closely tracked real-world experience as demonstrated by the NSDUH data?
A. Right. So in the course of building a model, one is continuously examining and evaluating the inputs and parameters and evaluating their impact on any number of outcomes.
And the calibration of the model is one set of outcomes that one is continually using as the model is being built and refined.
Q. So does your final --
A. It's like --
Q. I'm sorry, go ahead.
A. It's like a control panel, I mean, that one is looking at this as one of many measures of -- in the process of building and developing a model.
Q. But does your model in its final form include an estimate for 2016 of total OUD that's 15% higher than the NSDUH

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data?
MS. RITTER: Objection, asked and answered.
A. Yes, it does.
BY MR. SNAPP:
Q. Let me look at another line, which -- and then we can take a lunch break after this, but let me look at another line, lines 42 and 43, which I've highlighted on the screen.
And these are data related to overdose death Rx. What does that mean?
A. Overdose deaths attributed to prescription opioids.
Q. And that data came from -- the real-world data, actual data came from the CDC, correct?
A. Yes, sir.
Q. And is that CDC WONDER data?
A. Yes, sir.
Q. Now, does the CDC WONDER data have any shortcomings?
A. Yes, it does.
Q. You mentioned earlier that there were certain shortcomings with

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calculation of OUD in the NSDUH data. Can you describe those shortcomings first, and then I'll ask you about the CDC shortcomings?

A. The NSDUH data, the data from the National Survey on Drug Use and Health, does not capture well individuals who may be institutionalized, individuals who may be in jail or in long-term care facilities, individuals who are homeless, nor does it capture individuals that may have a lifetime history of opioid use disorder but not active or past-year opioid use disorder.

And this is a difference and an improvement of our model compared with many others, because our model does account for the 2.5 to 3 million people that may have lifetime use of -- opioid use disorder but not past-year opioid use disorder.

Q. So is your expectation based on the fact that they're not -- they don't have past-year opioid use disorder, is your expectation that they'll enter the opioid use disorder population actively at some time in the future?

A. Some, absolutely.

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Q. How did you -- what are you relying on to calculate how many of those nonactive lifetime opioid use disorder population are going to actually reenter the active OUD population?

A. Here again, our model included dozens, if not more, sources and populations, and I would want to refer to that documentation in order to, you know, provide that for you.

Q. Let's take a look at what we have on the screen right here. Before we do that, you mentioned there were some shortcomings with respect to the CDC WONDER data that you used in line 42. Can you describe those shortcomings for us?

A. Well, I think one concern is the adequacy of attribution of death within the data and variation across -- you know, so I think that's one of the main shortcomings.

Q. Explain that, please.

A. Well, it's not always obvious or clear to determine how someone died.

Q. Do you know how it's determined in Cuyahoga or Summit County how someone

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dies?

MS. RITTER: Objection, form.

A. It's -- you know, it's not what I was asked to assist the courts with. My belief is that they have medical examiners.

BY MR. SNAPP:

Q. And so what are some of the issues that arise in terms of medical examiners or others determining the cause of death when there are drugs involved?

A. I mean, that's beyond the scope of what I was asked to assist with in this setting.

Q. But you acknowledge that there are certain challenges with identifying opioid-related deaths like the ones you talked about before?

A. My sense is identifying cause of death can be tricky for a number of reasons. I mean, if you have just a body that shows up at the morgue, trying to walk through the cause of death I think can be a complicated task.

Q. For example, there might be polysubstance use?

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A. Yes.

Q. And then do you know how a medical examiner or other might decide of the various substances that show up in the toxicology screen, which one of those they might attribute as the cause of death? Do you know how that's done?

A. I do not.

Q. But that's one of the limitations of using the CDC WONDER data, correct?

A. Well, I think the wonder data -- I'm sorry, can you please repeat the question?

Q. So one of the limitations of using CDC WONDER data is the fact that different jurisdictions, different medical examiners, different people evaluating the cause of death might reach different conclusions based on the same toxicology screen?

A. I believe that's true.

MR. SNAPP: Okay. Why don't we take our lunch break now.

MS. RITTER: Okay.

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A. I'm with you.
Q. Two pages, you have to lay them down next to each other. Exactly. Thank you. But I can show them on the screen for purposes of what we're going to be looking at here.
Now, I want to talk to you about, in developing your model to predict national abatement costs, you had to make certain assumptions; is that correct?
A. Yes.
Q. And I want to talk to you about the assumptions that you made. Let's take a look at them.
So in -- I'm going to highlight on the screen Exhibit 8, lines 6, 7 and 8. You see I've highlighted them? Those values are assumed for purposes of the model, correct?
A. Yes.
Q. And if we go down to -- sorry. If we go down to line 20, the mass media target population is also assumed, correct?
A. Yes.
Q. How did you -- how did you come

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up with the number of 150 million for the mass media target population?
A. Well, this is an epidemic that's national in scope and affects, you know, tens of millions or hundreds of millions of people. So we felt that this was a reasonable starting point as an assumption for the number of people that might be reached.
Q. So were you trying to target a certain percentage of the overall U.S. population?
A. No.
Q. How did you come up with the number of 150 million?
A. Once again, it was based on what we believed would be a reasonable starting point for estimates and discussion around abatement costs for a media campaign.
Q. So in order to figure out how much -- what the target population in Cuyahoga and Summit Counties were, you'd need to actually understand the actual population of those counties; is that correct?
A. Can you ask that again, please?

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Q. If you wanted to localize the mass media target population to Cuyahoga and Summit Counties, how would you do so?
A. Well, one would want to know the size of the population and the nature of the media markets in those counties.
Q. Okay. But you haven't done that?
A. No.
Q. If we go down to line 28, this is the length of first responder training. That's another assumed number, correct?
A. Yes, sir.
Q. And if we look at line 30, is that another assumed number of the cost per first responder training?
A. Yes, sir.
Q. And then if we go down to line 47, which is the residential program population for pregnant women, is that another assumed number, sir?
A. Yes, sir.
Q. And if we go down to line 52, the cost per detailer per year, is that an assumed number also, sir?

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A. Well, there are -- I think we provide some information there as you've highlighted.
Q. Right. In fact, it's based on four separate assumptions within that particular parameter, correct? It says: These costs are based on several assumptions. Number one, detailers would work approximately 2,000 hours per year or 250 eight-hour days.
Number two, approximately one fifth of the detailer time would be administrative.
Number three, detailers would see approximately three prescribers per day and visit each prescriber once per calendar quarter, thus seeing approximately 150 unique prescribers per year.
Number four, the salary for a detailer, typically a trained pharmacist, would be approximately $125,000 per year. With travel, fringe and administrative support, the cost per detailer would be approximately $176,000 per year.
So is it fair to say that

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line 53, the cost per detailer per year, is itself an assumed number based on four separate assumptions?
A. Yes. Although we -- yes, it is, although I consulted with -- I mean, I reviewed some source information about academic detailing in order to derive that estimate.
Q. But it's an assumed number for purposes of your analysis, correct, the 276,000?
A. Yes. Yes.
Q. And if we look at line 56, number of physicians visited by a detailer per day, that's also an assumed number, correct? It says right here, assumed in --
A. Yeah, I don't know why --
Q. -- D.
A. Yes, I think it's an assumed number, although I don't fully understand the 300. There must have been -- I don't think that the value in the cell B56 is accurate, but I would guess that that was an assumed number, the number that would be visited a day.

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Q. Okay. I'm not sure where the 300% either came from, because in the printout it shows as 3.
A. Yeah, I would expect 3 sounds like the right number.
Q. Is it all right with you if I change that to 3 just so we're clear? Because I'm not sure why that came up that way.
A. Well, I'd want to consult the materials --
Q. Fine, absolutely.
A. -- but if you want to for the purposes of this discussion, that's fine.
Q. We'll leave it. We'll leave it as it is.
A. Okay.
Q. Line 57, number of unique physician visits by a detailer, it says 150, correct?
A. Yes, sir.
Q. And that's assumed. That's assuming that each physician will be visited each calendar quarter by a detailer, correct?
A. Yes, sir.

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Q. And then line 58 and 59 are also assumed numbers, correct?
A. Yes, sir. Although once again, as with other estimates that I've provided for academic detailing, I reviewed a number of source documents that I include in my expert report, and I believe that I may have used some of these in order to provide the -- in order to -- as a basis for the assumptions that are contained herein.
Q. But in many of these other lines, you've provided a source for the numbers, right?
A. Right.
Q. And for these that you just said "Assumed," you're just coming up with a number and plugging it in based on, I guess, your general knowledge based on the experience you've had, or what's it based on?
A. I don't recall precisely how I derived these estimates, but I have reviewed many scientific papers about academic detailing, and I've also reviewed proposals that have been written for the conduct of academic detailing. So that is to support

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academic detailing programs.
Q. Well, are these assumptions -- some of these assumptions -- and we're going to go through more -- some of these assumptions, assumptions that were made by the seven people that worked on your team to put together this report?
A. Well, I mean, ultimately, I supervised the entire time and I take full responsibility for all of the information that's presented within the materials that have been provided for the court.
Q. But I'm just trying to understand. Is the reason you don't know what they based a particular assumption on because it was something that was done by one of your team members and not by you directly?
MS. RITTER: Objection to form. That's not --
THE WITNESS: Can you ask that again, please?
MS. RITTER: Foundation.
BY MR. SNAPP:
Q. Sure.
Is the fact that you don't know

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what the source was for some of these assumptions that we've highlighted, is that fact because those assumptions were actually plugged in by one of your team members instead of you?

A. I don't believe so. I -- you know, there are dozens of sources here.

Q. Yes.

A. But if anything, I would -- but I was closely involved with the development of all of these materials, and I think if anything, if there's an -- if there was a source for which there was unclear value, that would significantly increase rather than decrease the likelihood of my participation in its -- in its estimation.

In other words, if there was -- the less clear the value, the greater the likelihood that I would have been even more integrally involved.

Q. But do you remember specifically any discussions with your team with respect to the assumed values that we've included so far, that we've highlighted so far, I should say, on this sheet?

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A. I do.

Q. Okay. Which ones?

A. Well, if we can start from the top.

Q. Sure.

A. So I recall discussions about the split of different MAT treatments.

Q. Okay. But those are still assumed numbers, right?

A. They are. And as I note, the current distribution is less evenly weighted across these three treatments.

Q. What about the mass media target population and the others highlighted here?

A. So I do -- I recall, you know, at the vaguest level, a discussion about the size of the mass media target population.

Q. Now, I asked you some questions about trying to localize the mass media target population.

In your April 3rd report, you localized one abatement number to Cuyahoga and Summit County by multiplying it by 1.5%, correct?

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A. Yes, as a -- I think the language that I included in the report about that process captures well my confidence and belief about that calculation.

Q. And what is your confidence and belief about that calculation?

A. Well, I'd like to refer to my report, if that's okay.

Q. It's right in front of you. Go ahead.

A. Okay. So in paragraph 175, I note that while the exact costs of abatement are difficult to estimate, and will depend upon the population requiring services -- so we've reviewed that sentence, so I think that's important.

Q. Right. You go on to say: It's possible to estimate the cost, nationally, of the efforts required to reduce further harms, in that sentence, correct?

A. The costs nationally, correct.

Q. Okay.

A. And then I note, in 176: I performed preliminary analyses of the national costs. My goal was not to identify

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the precise costs of any category, but rather to develop an initial estimate from which costs could be based -- and then I discuss my --

Q. Could be based, I'm sorry, just to finish. Could be based -- could be developed based on this Court's findings with regard to the nuisance in these jurisdictions. That's what you wrote, correct?

A. Correct. Correct.

Q. Okay. Go ahead.

A. And then I discussed the steps, and then I note in 179: For some categories, specific costs will depend upon decisions made by the Court or its designees, local policymakers and service providers.

And I give an example just of one -- one product, naloxone, and the very factors that could influence that.

And then I identify potential limitations of extrapolating from the national to a local level.

Q. Which paragraph is that?

A. 180.

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And then I -- and then I -- and then I say but nevertheless, and then, you know, I -- and I use just one proxy for the fraction of the global abatement needs that are represented by the counties of interest, Summit and Cuyahoga County. And that's the basis for that calculation.

Q. Okay. And you said global abatement. I think you meant national?

A. Correct. Correct. Yes.

Q. Okay. Very good.

So we'll come back to that, but I just want to -- let's continue going through the spreadsheet.

A. Yeah.

Q. This line 76, percentage of foster and adoption population younger than eight, that's another assumed number, correct?

A. Yes, sir.

Q. And line 78, rate of IVDU that is opioid use. That's an assumed number, correct?

A. Yes, sir.

Q. If we go down to line 98 where

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we're talking about drug disposal programs, lines 98 and 99 are both assumed numbers, correct?

A. Yes, sir. Here and in all instances, I should say assumed for the purposes of the estimates that I've provided.

Q. And assumed for purposes of running your model to calculate national abatement costs, correct?

A. Yes, sir, for these preliminary estimates, yes.

Q. If we look at line 119, this is the proportion of individuals served by each SSP. What's an SSP?

A. Syringe exchange program.

Q. And that's an assumed number also, correct?

A. Yes, sir.

Q. Now, lines 120 through 128 refer to, quote, unpublished federal data as your source.

Do you see that?

A. I do.

Q. What unpublished federal data are you referring to there?

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A. These were derived from a -- I don't know the specific source for these data points.

Q. Who would know?

A. One of the team members that assisted me in producing these estimates.

Q. And do you know if you provided that unpublished federal data to plaintiffs' counsel so that we could receive it as part of our review of this case?

A. I do not know.

Q. To my knowledge, we haven't received it, so I'm not sure what it is either.

If we look at the next line --

A. I mean, I can -- let me just say, I think there was a slide presentation, a PowerPoint deck that contained these estimates, and I think the deck was -- was delivered or built by someone working within a federal agency, but I don't have the specific source in my head, and I don't know, as I said, whether it was provided as part of the materials that were produced.

MR. SNAPP: I'm not typically

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one to request materials during a deposition, but we would like to receive those.

MS. RITTER: We made a note of that. I don't remember if you have it or not. I'll have to look.

MR. SNAPP: Thank you.

BY MR. SNAPP:

Q. Now, 132 and 133, lines 132 and 133, these are some more assumed values, assumed parameters in your model, correct?

A. Yes, sir.

Q. And those are the proportion of SCFs in cities similar to Baltimore and proportion of SCFs in cities similar to San Francisco, correct?

A. Yes, sir.

Q. Now, did you do any analysis of the proportion of SCFs in the cities of Akron or Cleveland or cities similar to Akron and Cleveland?

A. No, did not.

Q. So why did you choose Baltimore and San Francisco?

A. These -- I think that these

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cities were selected based on population and the -- I don't have a good answer for you. I didn't select these cities.
Q. Someone on your team did?
A. Yes, sir. And I --
Q. And line -- I'm sorry.
A. I should mention as well, you had asked for the individuals that worked on, you know, these materials, and so in reviewing this, it occurs to me that two additional people, I should mention. So one is Susan Sherman, S-H-E-R-M-A-N, and the other is Cassandra Crifasi. I believe her last name is C-R-I-F-A-S-I.
And so they -- they worked a long time ago -- which is why I wasn't thinking of them actively -- with me on individual abatement categories.
Q. How long ago?
A. I don't know.
Q. Before you started putting together your report?
A. Yes.
Q. Before your visit to Akron in July of 2018?

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A. I don't know.
Q. Just so we're clear, I highlighted line 129. That's another assumption. I don't think I asked you about that one, but that's another assumed number, correct, the number of new supervised consumption facilities to open in the U.S.?
A. Yes, it is.
Q. Is that an annual number?
A. Yes, it is.
Q. And do you have an understanding of whether certain laws would need to be changed to open a supervised consumption facility in some jurisdictions?
A. Can you ask the question again, please?
Q. Do you know one way or another if supervised consumption facilities are allowed in every jurisdiction in the United States?
A. My understanding is that currently they are not.
Q. And so in some jurisdictions, there would be a need -- there would need to be a change in law for a new supervised

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consumption facility to open, correct?
A. Yes, sir, I believe that's the case.
Q. Do you know if that's the case in Cuyahoga or Summit Counties?
A. I believe it's the case.
Q. And so the abatement remedy with respect to -- that you're proposing with respect to supervised consumption facilities would require a change in the law in Summit and Cuyahoga counties; is that fair?
A. No. I was not asked to design an abatement program for these counties. I was asked to identify evidence-based approaches to abate the opioid epidemic at a national level.
And in my report, I both qualify with respect to this particular instance and also note in many places that it really falls upon the communities themselves to review what I've proposed and to decide what they're already doing, what they need to do more of, what they should be doing less of and how it all fits together.
Q. Do you know if the judge in

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this case would be able to order a change in law to require the opening of additional supervised consumption facilities?
MS. RITTER: Objection, foundation.
A. You said additional -- can you you that --
BY MR. SNAPP:
Q. Supervised consumption facilities.
Do you know if the judge in this case has the power to change the law so that additional supervised consumption facilities can be opened in the U.S.?
MS. RITTER: Same objection.
A. I do not.
BY MR. SNAPP:
Q. The next one that I highlighted here is line 137, number of fentanyl testing strips needed per injection, and that's an assumed number, correct, for purposes of your calculations?
A. Yes, sir.
Q. And line 140, extra costs for program management, administrative personnel,

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shipping. If you look up at the top, machines set up and maintenance for harm reduction total cost.

Do you see that up here?

A. Yes, sir.

Q. So is that an assumed number also, sir?

A. Yes, it is.

Q. Please scroll down on the spreadsheet to lines 152 through 156. Are these all numbers that were assumed for purposes of your model?

A. Yes, they were. Although here again, these were developed with -- as with many other estimates, with either or both a review of literature and scientific findings as well as a consultation with experts in the field.

Q. But for each of these numbers, the midsized police departments, law enforcement-assisted diversion cost and the same cost from small police departments as well as the size of specialized overdose units for large police departments, for midsized police departments and for small

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police departments, you don't have a source other than to say that you're assuming these numbers, correct?

A. For the purposes of the materials that have been produced, we've -- I've identified these as assumed values. They are based, once again -- all of these parameters and estimates are based on a combination of our best judgment, my expertise, review of scientific information, and the experience of others that provided input as I developed these estimates.

And this really was, once again, intended as a framework for considering the cost of abatement.

Q. Understood.

And so one last assumed number here is in line 160, which I'm highlighting on the screen, number of hours required for stigma reduction training.

That's also an assumed number for purposes of your model; is that correct, sir?

A. Yes, sir.

Q. So we have gone through, and we

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counted them up and we can count them up again if you want, but I've highlighted 28 separate lines of assumed values within the parameters that you have plugged into your model.

Does that sound about right? I mean, you can count them if you'd like.

A. I would have to if I --

Q. Okay. Well, would you like to, because I'm --

A. No, I don't feel the need to.

Q. Okay.

A. But I just can't -- I'm not positive there are 28, but I take your word for it.

Q. There are 28.

A. Okay.

Q. I'm told there are 28.

A. Okay. Fair enough.

Q. And that's 28 out of -- you have a total of 164 parameters, correct?

I'm sorry, it's actually less than 164 parameters because you've got titles in here.

A. Line headers, right.

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Q. So it's somewhere less than that.

A. Okay.

Q. So give or take --

A. 15.

Q. -- roughly 15-20% of your parameters are assumed; is that right, sir?

A. I think there are about 150 total, and how many did you say were assumed?

Q. 28.

A. Okay. So it would be about one sixth.

Q. So 15 to 20% is accurate?

A. Yes.

Q. Now, I want to make sure I understand your testimony. You said the assumed parameters, the assumptions were based on judgment, your experience, review of scientific information and the experience of others who provided input as you developed these estimates; is that right?

A. Can you please read the list again?

Q. Judgment?

A. Yes.

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correct?
A. Yes, sir.
Q. And so the number of assumptions that are included -- incorporated into your model are actually more than just the 28 I pointed out to you, correct?
A. Yes, sir. I mean -- yes, sir.
Q. So what I'm talking about is the assumed parameters that you plugged into the model, there are more than just the 28 that I highlighted on the screen. There are others that are derived from those highlighted assumed numbers, correct?
A. Yes, sir.
Q. Okay. If we count those up -- I think we counted 52, but we're not going to go through those today.
A. Okay.
Q. It's 52, the 28 plus 24 would get you to 52, so...
So we were looking before we started --
MR. SNAPP: We can turn that off. Thank you.
///

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BY MR. SNAPP:
Q. Before we started looking at the spreadsheet we were looking at paragraph 180 and 181 of your report. I think you were reading some language from 180.
In paragraph 181, you state that your abatement estimate does not address how abatement costs should be shared across different parties; is that correct?
A. Yes, sir.
Q. And so just to be clear, you haven't attempted to identify and quantify the impact of any alleged wrongdoing by any defendants on opioid-related outcomes and subsequent costs, correct?
A. Correct.
Q. Does your model assume that the defendants are responsible for all of the abatement costs --
A. No, sir.
Q. -- that it predicts?
Does your model have anything to do with who should pay for what?
A. No, sir.

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Q. Now, if we look at -- staying on the same spreadsheet, if we go up to line 145, this is your research line?
A. Can you power up my screen, please?
Q. Oh, I'm sorry, yes. Can we have that? Thank you.
A. Thank you.
Q. If we're looking at the research line, which is 145, I'm going to highlight it in green. It's -- that makes it difficult to read. Sorry. Let's change it to a different color.
It's -- your source for your $1.1 billion research budget is the NIH 2018 HEAL Initiative budget. What is that?
A. It's a -- I'm sorry, can you please ask the question again.
Q. Sure. What is NIH 2018 HEAL Initiative budget?
A. Well, I provide a source that describes in further detail the HEAL Initiative.
Q. Okay.
A. This is a broad-reaching, you

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know, multi-institute initiative of the National Institutes of Health to reduce morbidity and mortality from the opioid epidemic and to improve pain care through scholarship and discovery, through scientific investigation.
Q. Are you aware from the source that you cite there that the $1.1 billion of funding for the HEAL program already exists through congressional funding?
MS. RITTER: Objection, foundation.
THE WITNESS: Can you ask that question again, please?
MR. SNAPP: Sure.
BY MR. SNAPP:
Q. Have you -- in the source...
(Whereupon, Deposition Exhibit Alexander-10, Press Release, NIH launches HEAL Initiative, was marked for identification.)
BY MR. SNAPP:
Q. Sir, I'm handing you what's been marked as Exhibit 10 to your deposition. Thank you. And this is a press release from

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April 4th, 2018 talking about -- the title is NIH launches HEAL Initiative, doubles funding to accelerate scientific solutions to stem national opioid epidemic.

Do you see that?

A. Uh-huh.

Q. You have to answer verbally. Sorry.

A. Yes. Yes. I'm sorry.

Q. Thank you.

And in the first paragraph below the picture, there's a sentence that says: NIH is nearly doubling funding for research on opioid misuse/addiction and pain from approximately 600 million in fiscal year 2016 to 1.1 billion in fiscal year 2018, made possible from a funding boost by Congress.

Do you see that?

A. Yes, sir.

Q. So do you have an understanding that the $1.1 billion that you included as part of your abatement remedy for the NIH 2018 HEAL Initiative is actually already fully funded by Congress?

A. Yes, sir.

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Q. And are you going to be giving any testimony if you testify at trial with respect to whether the defendants should pay for that $1.1 billion in funding?

A. Well, I -- once again, I don't know whether I would be testifying in trial, and if so, I would speak to anything that I was asked to speak to.

Q. Were you suggesting, sir, by including that number in your analysis, that the defendants should pay for the entirety of this program that's already federally funded?

A. I -- my goal was to identify remedies and then to try to provide national estimates for what I thought these would cost.

And in some cases, considerable investments may already be being made by any number of parties in some of these categories, and so I wasn't asked nor did I attempt to identify either how responsibility should be shared across parties or how monies should be -- how claims should be made against various parties as a function of how much has already been invested.

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So I don't know if that answers the question, but I really didn't consider the amount already being invested as I made estimates of what I thought investments would ultimately take.

Q. So it's fair to say that you don't think -- you don't have an opinion one way or another whether the defendants should pay for a program that's already been federally funded; is that fair?

A. No.

Q. That's not fair?

A. No. I mean, I have not thought a lot about it, but I don't have a formulated -- at this point, I would want to think more about it. It's a complex question, and I would want to think more about it. It's not something that I was asked to prepare for in this report.

Q. Fair enough. And you don't have an opinion on that issue today, correct?

A. Correct.

Q. Thank you.

So I assume, sir, that the same analysis that you just went through in your

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answer to me would apply with respect to the existence of Ohio's prescription drug monitoring program, correct?

A. When you say the same analysis, can you ask the question again?

Q. Sure, I'm sorry. I was just trying to shortcut things.

A. Of course.

Q. Trying to get you out of here.

A. Well, I'm not complaining about that, but...

Q. So my point is simply that you have not taken into account the costs that the state of Ohio has already incurred in establishing its PDMP or prescription drug monitoring program, as part of your model; is that correct?

A. Correct. Correct. My -- in no case did I look at how much is actually being expended and use that to decide how much I thought future abatement costs would be.

Q. Fair enough.

And in terms of the PDMP that exists in Ohio, is it your understanding that that's a state program or a county program?

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national abatement costs within any of these categories, did you calculate a confidence interval for your estimates?
A. We -- are you asking about a specific one of these or for any of them?
Q. Any of them.
A. Okay. In developing these estimates, I examined a number of different assumptions around -- assumptions regarding the components of a given category.
So, for example, if we consider the effects of -- if we consider the costs of care required for pregnant women and neonates, so these are women that have opioid use disorder or children born, for example, with opioid use disorder, I examined how the estimates that I provided would vary based on differences in the inputs.
So essentially, I did examine how sensitive the final dollar amount was to the assumptions we were making.
Q. That's not a true confidence interval, is it?
A. No, it is not.
Q. And so you did not calculate a

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confidence interval around your calculations, your abatement cost calculations; is that correct?
A. I did not.
Q. Now, with respect to these abatement cost interventions that are listed on the sheet that we have on the screen, you would certainly expect the need for a mass media campaign to go down over time, right?
A. I am not sure about that.
Q. Why not?
A. Because as I outline in my report, there are profound misconceptions that have allowed for the epidemic to flourish, and substantial gaps in quality of care for those in pain as well as gaps in care with respect to the use of opioids.
So I think this is an epidemic that's been -- depending upon when you define the start, that's been, you know, decades in the making, and I believe that constant investment in a media campaign over the next decade is a reasonable approach.
Q. Just focusing on this mass media campaign for a moment -- well, strike

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that.
There's a paragraph in your report that I want to ask you about. I just didn't understand it, so paragraph 181, Deposition Exhibit 1. Second sentence says: In addition, some (e.g., "Medication Assisted Treatment"), but not all, of my estimates exclude costs arising from individuals with heroin use disorders without prior prescription opioid use.
Can you explain what you mean by that?
A. One of the improvements that I believe is reflected in our model that has not been reflected in prior Markov models of the opioid epidemic is that we separately account for a population, the minority of individuals that have heroin use that have not had prior prescription opioid use preceding the heroin use.
And in our estimates of the costs of treatment that we reviewed in Scenarios B, C and D, we exclude the costs of treatment for individuals using heroin whose heroin use did not start with prescription

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opioids. In other words, we provide conservative estimates that exclude the population of users of heroin that didn't start with prescription opioids.
Q. Did you do anything to exclude heroin users who started with nonmedical use of opioids?
A. I would have to review the source documentation for the specific questions that we used from the data sources that we used, such as NSDUH, in order to understand -- in order to be able to answer that question accurately.
Q. Because when we started out today looking at one of your -- we were actually looking at this cover sheet -- actually, I'm sorry, wrong model. We were looking at the concept sheet of your MAT Model 2.0 version 51. We talked about the fact that you can't go from the general population to nonmedical use of opioids.
But did you exclude from your model heroin users who went directly from the general population to the nonmedical use of opioids without the interim step of a medical

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also -- the sampling method makes a big difference in terms of the ways that individuals were sampled. And lastly, this may be examining current participants rather than the opportunities for future use. And my abatement plan is forward-looking. It's not looking back. It's looking forward.

So I don't -- so while this information is helpful, it would only be one of many pieces of information that I would rely on to derive an estimate regarding the number of people that would be appropriate for drug court.

Q. Well, wouldn't it be more reliable if your model looked at just those in drug courts, the drug court population that was there because of prescription opioid use?

MS. RITTER: Objection, form.

THE WITNESS: Can you ask that again, please?

BY MR. SNAPP:

Q. Sure.

I'm just trying to understand if your model would be more reliable if it

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included, rather than the entire drug court population that includes all these other drugs, it only included those who were there for prescription opioid use.

MS. RITTER: Objection, form, foundation. That's not what he said.

MR. SNAPP: Let's broaden it.

BY MR. SNAPP:

Q. Let me just broaden it.

Wouldn't your model be more reliable, sir, if it focused only on the drug court population that was in drug court because of opioid use?

MS. RITTER: Objection, form.

A. My goal is in identifying national needs, and specifically with respect to drug courts, I think that these should be forward looking and based not just on the number of current utilizers that have opioid-related encounters with the criminal justice system, but also the number that -- the unmet need and the unfulfilled need.

So I think that's very important, and I do note here this -- on page 27, it appears to me that these data

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were derived from 2008, and, of course, there's been enormous changes since 2008 in terms of morbidity and mortality from the epidemic.

But --

MR. SNAPP: Can we get the screen again, please.

BY MR. SNAPP:

Q. So is it your testimony, sir, that this number, this 120,000 drug court population, is exclusively people who are in drug court because they used opioids?

A. No, it is not.

Q. And your model would be more reliable in addressing the opioid issues that arise from the opioid epidemic if it were focused solely on a drug court population of opioid users, correct?

MS. RITTER: Objection to form, foundation.

THE WITNESS: Can you ask that again, please?

MR. SNAPP: Certainly.

BY MR. SNAPP:

Q. Your model, in terms of its

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criminal justice intervention abatement cost calculations, would be more reliable if the drug court population that you were focused on was only the drug court population that was in drug court because of the use of opioids?

MS. RITTER: Same objection, form, foundation.

A. Yeah. What I would say is that the population that I think abatement estimates should be built on for this category is the population that are either currently in drug courts because of opioid-related crimes or encounters with the criminal justice system, or the population where there's unmet need and where drug court should be expanded.

And it may be that that latter group is an enormous population. I think that I would want to look at this and other documentation in order to be able to provide the courts with additional information about that.

BY MR. SNAPP:

Q. Understood.

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A. Correct. Correct.
Q. So that's not -- I'm sorry. Go ahead. I don't mean to talk over you, sir.
A. So I think that would represent -- if we think that that represents half of the counties, that's the current volume of participants in drug courts in half of the counties in the United States.
So even without assuming something about unmet need, of which I think in many communities there's large amounts of unmet need, it would suggest that if there were drug courts in the entire United States, assuming that these 50% where the drug courts are currently present are representative of the counties where they're not, that the drug court population could be currently as high as 240 without any scaling of that 240,000.
Q. Assuming that's correct, only some subset of that population, even your assumed population --
A. Yeah.
Q. -- would actually be in drug court due to opioid use, correct?
A. That's correct.

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Q. And so you have done no calculations to determine what percentage of your 120,000 drug court population is actually in drug court as a result of using opioids; is that correct?
MS. RITTER: Objection, form.
A. Well, if we use the numbers from this report and we assume that if there are 120,000 in drug courts in half of the counties because half of the counties don't have them, and so we double that to assume that if every county had them and they were operating at the same capacity, we'd have about 240,000, then our estimate of 120 would represent that -- an assumption that about half of current -- current drug court participants are utilizing the drug courts because of opioid-related offenses.
BY MR. SNAPP:
Q. But that's not what you did in your model, right?
A. Well, we have in our model an estimate, and the estimate was derived from this source documentation.
Q. But you have no -- no source

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for an estimate that half of the participants in drug court are there because of the use of opioids.
A. I don't have a precise source to provide you to support that assumption.
Q. You don't have any source to support that assumption, do you?
A. Well, as I noted before, there were four categories of -- there were four sources, ultimately, of information, at least, that I used to derive the estimates that I've provided, these preliminary estimates and this framework, and so -- but I can't identify specific -- you know, there are no further written sources that I provided of peer-reviewed publications or other publications.
Q. Those four sources were judgment, your experience, your review of scientific literature, and the experience of your team members, correct?
A. Yes.
Q. And you can't point to any one of those that tell me that -- what percentage of this 120,000 drug court population can be

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attributed to those in drug court because of opioids?
A. The 120,000 is our -- the 120,000 is my estimation of the population that could be served because of opioid-related crimes in a national abatement model.
Q. With drug courts in every county in the United States, correct?
A. Well, I mean...
Q. Maybe I'm misunderstanding your testimony. Is that what you testified to a few minutes ago?
A. The estimates that I provide for -- the 120,000 is my best current estimate of the number of individuals that could be served for -- through drug courts for opioid-related morbidity in the United States.
Q. Existing drug courts or drug courts in every county?
MS. RITTER: Objection, form.
A. I don't address that in my -- you know, in my report.
///

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Q. And so do you agree, sir, that the medical care CPI calculation includes a number of services that would not be part of your abatement remedies?
A. Well, the -- may I look at this document for a few more minutes?
Q. We can go off the record and you can look at it, sure.
MS. RITTER: Okay.
A. Well, I don't -- what do you mean by off the record? Just take a break?
BY MR. SNAPP:
Q. So it's not counting against my time.
A. Oh, no, no, that's fine then, we don't have to do that. Can you ask the question again, please?
Q. Do you agree, sir, that the medical care CPI calculation includes a number of services that would not be part of your abatement remedies?
A. I do.
Q. Did you consider using any other measure of CPI from the Bureau of Labor Statistics?

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A. Once again, the decision about which inflation rate to use and how it should be applied I believe was made based on the expertise and the input of members of my team as well as conversations with counsel and perhaps others involved in the litigation.
Q. Did you consider using any other CPI measures?
A. I believe that several may have been considered, and it's a -- so I believe that several may have been considered.
Q. Did you consider, sir, using the U.S. City All Urban Consumers CPI.
A. I don't know -- I don't know which indices were evaluated and so -- I don't know which indices were evaluated.
Q. So you don't know if you considered the All Items CPI for all U.S. cities?
A. When you say "you," are you referring to the team that I supervised as well as the others that were involved in this process?
Q. Sir, you've said a number of times that this is your report and you're

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responsible for the report, so I'm talking about you.
A. Okay.
Q. And you supervised the team, so I'm asking: Did you consider using any other alternative measures of the inflation rate using other CPI indices?
A. I believe we did.
Q. And did you include -- in your analysis, did you consider using the All Items U.S. CPI from the Bureau of Labor Statistics?
A. I don't recall.
Q. Are you aware that there are CPI statistics for the Midwest, which include Ohio, available? You're aware that those statistics are available, right?
A. I'm sorry, can you ask the question again?
Q. Let me back up, sir.
Have you used Bureau of Labor Statistics inflation rates in any of your other work?
A. I do not believe so.
Q. And is it fair to say that you

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relied on your team to decide which CPI number to use in this context, and the lawyers involved?
A. Yes, it is.
Q. Do you know if they considered using -- if your team and the lawyers considered using the Cleveland/Akron all item CPI data from the Bureau of Labor Statistics?
A. I don't know, but I'm not sure that I would have suggested such, because my report focuses on developing a national abatement plan, and I've left it to other experts to develop plans specific to Cuyahoga and Summit Counties.
So in developing my national estimates, I don't know that I would be comfortable or advise using one jurisdiction's inflation factor over another's.
Q. Okay. But even in your -- in your 15 categories, many of these categories that are on the screen right now do not relate to medical care, correct?
A. That's correct.
Q. And yet, your team and the

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as best I can with my scientific knowledge.
I did not multiply 0.015 times the bottom-line numbers in any of those scenarios in order to identify a value that would be the analogous value to the $6.7 billion that's in paragraph 180 of Exhibit 1, but that would be the nature of such a calculation.
Q. Sir, are you saying that you intend to do so in the future, if asked?
A. Are you asking whether I intend to multiply one number by 1.5%?
Q. Yes.
A. Because that's -- that's what we would be talking about.
Q. Okay.
A. I don't know.
Q. Okay. Do you think that 1.5% calculation that you did in paragraph 180, is that a reliable method of determining what portion of abatement costs should be attributed to Cuyahoga and Summit Counties?
A. I believe there's other -- I believe there are other experts who are focused squarely on doing just that.

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Q. And so is the answer to my question you don't know?
A. I'm sorry. Let me clarify.
I believe there are other experts whose work is focused on estimating the specific costs in Cuyahoga and Summit Counties.
Q. Do you see any limitations in doing the calculation that you did to get to 1.5%?
A. Yes, I do.
Q. And what are those limitations, sir?
A. I looked at one measure of morbidity or mortality in one year as the method of allocation, and I believe that that's a limited -- a limited way to appraise attributable share or allocation share.
It's not what I was asked to do. I was not asked -- I mean, I provided paragraph 180 as a high-level qualified caveated approach of thinking about the potential costs in two counties in the United States.
Q. And so that 1.5%, if you

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applied it to each of your individual abatement remedies, would that be a way to figure out, with all the caveats that you included, how much each of those abatement remedies should cost within Cuyahoga and Summit Counties?
A. There are other experts whose work has focused squarely on identifying the needs and costs of those counties.
Q. For example, if I wanted to determine -- I understand what you're saying, but if I wanted to determine for your mass media campaign the population that you were focused on with your mass media campaign in Cuyahoga and Summit Counties, would I take the 150 million multiplied by 1?%?
A. I'm sorry, where is the 150 million coming from?
Q. Well, that's the population that you used in mass -- for mass media, the mass media target population that's on the screen right now. And you -- that remained constant year after year.
So if I wanted to figure out the mass media target population within

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Cuyahoga and Summit Counties, would I multiply that by 1?% if I were using your methodology?
A. No.
Q. What would I do?
A. Well, I'm not sure -- I mean, if you multiply 150 million by 1.5%, there's no dollar signs in there, so I don't know that that -- that's a population times a percent.
Q. Well, there's no dollar signs in opioid overdose deaths either, sir, but you used that as a percentage -- that's how you got your percentage, right?
A. Yeah, I think I may have misunderstood your question. Can you please ask again the question about mass media?
Q. Sure.
So using your methodology of attributing a certain portion of national abatement costs to Cuyahoga and Summit County by multiplying the numbers by 1.5%, if I wanted to figure out the mass media target population in Cuyahoga and Summit Counties, would I multiply the 150 million by 1.5%?

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MS. RITTER: Objection, foundation.
A. No. I mean, I didn't design these estimates to be multiplied by 1.5% to derive individual abatement estimates for each category for the counties. But even if you -- so that was not my intent, but even -- so that was not my intent.
BY MR. SNAPP:
Q. But isn't that essentially what you did by taking the -- all the different numbers, all of the different calculations that are here in Exhibit 3 for each of the abatement categories and adding them up and then multiplying them by 1.5%? Isn't that exactly what you did?
A. Well, so I guess I'm not fully understanding the intention of your question. So let me clarify one thing first.
I think if you were to want to know if you -- assuming that the abatement estimate that I made for mass media is correct, let's just take year one, it was, based on what you're showing here, about $568 million. So the 1.5% would be

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multiplied by 568 --
MS. RITTER: 5.6 billion.
THE WITNESS: That's the ten-year cost. I was just doing year-one costs.
MS. RITTER: Okay. I'm sorry.
A. Okay. We can take the ten-year costs. If one were to multiply out, one would be multiplying 1.5% by the 5.7 billion, not by 150 million. In other words, you would be multiplying the fractional morbidity that we believe has accrued in the counties by the total estimated cost for the media abatement campaign in the counties.
So that's to clarify a prior question that I believe you asked when you asked would you multiply 150 million by something.
BY MR. SNAPP:
Q. So --
A. But with all of that said, this was just -- as I write in my report, this was, you know, ultimately detailed assessments of the specific costs will be required and there are a number of

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limitations in extrapolating from national estimates to specific localities. Nevertheless -- and then I used this example.
And I've provided -- I've given you some examples of why I think that 2017 overdoses has limits in terms of understanding the share of the total abatement costs that would be reasonable to allocate to these specific counties.
Q. Okay. So just as another example, if you were to take your 1.5% and multiply it by the mass media target population, you'd get 2.25 million. That's the math, okay?
A. Okay. Okay.
Q. And just for your information, in Cuyahoga and Summit Counties -- and I can show you the Census Bureau information --
A. Right.
Q. -- there are only 1.78 million people in both counties combined, so you'd be overestimating the mass media target population costs by using the simple 1.5%, correct?
A. Yes.

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Q. And that's a limitation of using any sort of calculation to allocate -- any sort of simple calculation to allocate national abatement costs to any particular jurisdiction, correct?
A. Yes. Yes.
Q. Sir, if you could turn to your Exhibit 1 again, which is your April 3rd report, I think you've already explained this, but I just want to make sure I understand.
In paragraphs 35 through 39 of the report, you discuss the fact that opioid -- the opioid epidemic has impacted communities differently, correct?
A. Yes, sir.
Q. And you say, because of that -- because of this, there's not a one-size-fits-all approach with respect to the abatement remedies, correct?
A. Yes, sir.
Q. And then further down in the paragraph -- well, you discussed in that same paragraph the fact that some communities have had different investments in abatement

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A. Yes, I do.
Q. Do you have any a priori precision requirements for your model?
A. Well, the model -- I mean, there's a Markov model and then there are redress estimates, and so are you referring to the Markov model or the redress estimates?
Q. The one you called the APOLLO model, I suppose.
A. Okay. And your question is do I have a priori requirements for certain levels of precision?
Q. That's exactly what I asked, yes.
A. Yeah. We -- you know, I think as I spoke before, ultimately the model is calibrated, and those calibrations are one of the principal methods that we use to examine and that one uses to exam the adequacy of the model.
And in this instance, I calibrated the model in order to fit it as best I could to a variety of parameters that I had the greatest confidence in. And then we assessed the -- you know, we assessed the

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quality of the model in many ways.
Q. So let me go back to my question.
A. Yeah. Yeah.
Q. Sitting here today, are there current precision requirements for your model, that it has to be within plus or minus 5%, 10%, some other measure that one might have for precision according to the standards of pharmacoepidemiology?
A. No, the overall fit and quality of the model is based on many different factors.
Q. Okay.
A. And so there's not one single parameter that we say we need to be able to estimate overdose deaths plus or minus 5% or this model is no good. The answer is no, there's no single factor -- there's no single a priori requirement for a given component because there are, you know, dozens of parameters and a dozen or more boxes.
Q. So you're not even saying I know that whatever comes out of my model will be plus or minus 5%, correct?

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A. Well, there are a number of ways that -- there are a number of steps that I took and that one takes in order to assess and ensure the quality of a model such as the model that we've built.
Q. Sitting here today in terms of the requirements of your model, it wasn't built in a way that it can guarantee the results will be even within 5%. You'll give a point estimate, but you won't have any degree of precision as to the reliability of that, correct?
MS. RITTER: Objection to form.
THE WITNESS: Can you ask that again, please?
MR. ALEXANDER: Sure.
BY MR. ALEXANDER:
Q. The way your model is set up, it gives a variety of point estimates, correct?
A. Yes.
Q. And there will be no level of certainty that any of those point estimates will be accurate within any certain percent, even 5% or 10%, correct?

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A. Well, we -- you know, we did not have an opportunity to discuss this, but we include sensitivity analyses, and these have been provided as part of the model. And what these analyses do is they assess the robustness of the model. They assess whether or not, when you change one parameter, an outcome that one cares about changes plus or minus 5% or not.
Q. So sensitivity is different than what I'm talking about, which is that you have a degree of confidence, like -- let's take a step back.
When you publish papers, you typically have something where you say -- before you ever start the research project, you'll have a requirement that whatever you will present will have to be statistically significant within certain parameters based upon like a .05 p value or other fairly standard statistical measures, correct?
A. When conducting hypothesis testing, yes.
Q. And when conducting something that's going to put out any kind of point

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Q. And you don't know what any of those reasons would be for Cuyahoga or Summit Counties in terms of why they did what they did or why they failed to do what they might have done better?
A. That's not true.
Q. Do you know like what the budget restrictions have been or impact of budget cuts since 2008 have been in those counties?
A. Well, it wasn't the focus of my report, but in the -- in the materials that I've read, it's clear that resource constraints are a major issue for both counties.
Q. Okay. And did you look at why there have been resource constraints?
A. Can you say more about what you mean by look?
Q. For purposes of forming an expert opinion in this case that you would offer at trial if called at trial, have you evaluated why there have been resource constraints in Cuyahoga and Summit County that affected their ability to institute

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timely and effective measures to combat the opioid epidemic?
A. I've not done so comprehensively, no.
Q. Does any aspect of your model take into account how things would be different if either or both of these counties had acted reasonably in terms of combatting the crisis from the first time that they should have started acting to combat it?
MS. RITTER: Objection to the form.
THE WITNESS: Can you ask that again, please?
MR. ALEXANDER: I can have it read back. Could you please do that.
(The following portion of the record was read.)
"QUESTION: Does any aspect of your model take into account how things would be different if either or both of these counties had acted reasonably in terms of combatting the crisis from the first time that they should have started acting to combat

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it? "
(End of readback.)
MS. RITTER: Then there's my objection to the form, foundation. I guess it shows up again.
A. So I developed a national model. I didn't develop a county model.
BY MR. ALEXANDER:
Q. Okay. So the answer is no, no, my model doesn't do that and I didn't account for that?
MS. RITTER: Objection to the form, foundation again.
A. Yeah, my model is not -- you know, the redress estimates that I provide do not factor in the ways that different jurisdictions may or may not have acted most efficiently in combatting the opioid epidemic.
BY MR. ALEXANDER:
Q. Let me ask it this way.
A. Yeah.
Q. So you've recognized in some of your questioning and in the report that some of what you propose requires actions at the

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local level, the county level, the state level, the federal level, and by various stakeholders, including healthcare professionals and other kind of private citizens and companies.
Is that a fair statement?
A. Yes.
Q. And so your model isn't directed towards saying here are the costs that would only be incurred by a certain level of government, the county-level costs or the federal costs or the state costs.
All of your costs are across all of those governmental levels and include private costs as well, correct?
MS. RITTER: Objection to the form.
A. Yeah, my model wasn't focused on figuring out who should shoulder the costs; it was merely to estimate the costs. So it wasn't to figure out who should shoulder them or how much they're already being paid for by others. It was just to figure out what the costs -- it was to provide a preliminary framework for thinking